

Importation of Fresh *Cichorium endivia* and *C. intybus* for Consumption From Ecuador and Nicaragua into the United States

Qualitative, Pathway-Initiated Pest Risk Assessment

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A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the importation into the United States of fresh *Cichorium endivia* (chicory root, escarole) and *C. intybus* (endive, radicchio) grown in Ecuador and Nicaragua. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low as opposed to a quantitative risk assessment which expresses risk in numerical terms such as probabilities or frequencies.

International plant protection organizations (e.g., North American Plant Protection Organization (NAPPO) and the United Nations Food and Agriculture Organization (FAO) provide guidance for conducting pest risk analyses. The methods we used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO and FAO. Our use of biological and phytosanitary terms (e.g., introduction, quarantine pest) conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995).

Pest risk assessment is one component of an overall pest risk analysis. The *Guidelines for Pest Risk Analysis* provided by FAO (1995) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

The Food and Agriculture Organization (FAO, 1995) defines "pest risk assessment" as "Determination of whether a pest is a quarantine pest and evaluation of its introduction potential". "Quarantine pest" is defined as "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (FAO, 1995; NAPPO, 1995). Thus, pest risk assessments should consider both the likelihood and consequences of introduction of quarantine pests. Both issues are addressed in this qualitative pest risk assessment.

This document presents the findings of our qualitative plant pest risk assessment. We have not described in detail our assessment methods or the criteria we used to rate the various risk elements. Details of our methodology and rating criteria can be found in our "template" document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, Version 4.0* (USDA, 1995); to obtain a copy of our template, contact the individual named in the proposed regulations.

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; we initiated the assessment in response to the request for USDA authorization to allow imports of a particular commodity presenting a potential plant pest risk. In this case, the importation of fresh *Cichorium endivia* and *C. intybus* leaves, stems, and roots grown in Ecuador and Nicaragua into the U.S. is a potential pathway for introduction of plant pests. Quarantine 56 (7 CFR §319.56) provides USDA,

APHIS regulatory authority for importation of fruits and vegetables.

Cichorium is but one of about 1314 genera within the family Asteraceae. There are about 8 species in the genus. Two species, *Cichorium intybus* and *C. endivia* are used as salad greens. The roots of *C. endivia* may be roasted for a coffee substitute, or dried for medicinal use.

2. Assessment of Weediness Potential of *Cichorium*

Table 1 shows the results of our weediness screening for *Cichorium*. These findings did not require us to initiate a pest-initiated pest risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Cichorium* spp.

Phase 1: *C. intybus*, *C. intybus* var. *foliosum* and *C. endivia* are all established in the U. S.

Phase 2: Is the species listed in:

Yes *Geographical Atlas of World Weeds* (Holm, 1979)

No *World's Worst Weeds* (Holm, 1977)

Yes *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)

Yes *Economically Important Foreign Weeds* (Reed, 1977)

Yes Weed Science Society of America list (WSSA, 1989)

Yes Is there any literature reference indicating weediness (e.g., *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

Phase 3: Conclusion:

The literature search yielded several articles concerning *C. intybus* and *C. endivia* as weeds. However, the two species are too well established and widespread in the U.S. to be considered as candidates for the Federal noxious weed list. The *Geographical Atlas of World Weeds* lists *C. pumilum* as a principal weed of Israel, a common weed of Egypt and Lebanon; and, *C. spinosum* is listed as weed in Greece.

3. Previous Risk Assessments, Current Status and Pest Interceptions

3a. Decision history for *Cichorium*:

Cuba - 1926. *Cichorium intybus* - entry permitted subject to inspection.
Colombia - 1956. *Cichorium* spp. - entry permitted subject to inspection.
Belize - 1963. *Cichorium* spp. - entry permitted subject to inspection.
Chile - 1980. *Cichorium* spp. - entry permitted subject to inspection.
West Indies - 1984. *Cichorium* spp. - leaves and stems permitted entry subject to inspection.
Guatemala - 1987. *Cichorium* spp. - above ground parts permitted entry subject to inspection.
Costa Rica - 1988. *Cichorium* spp. - entry permitted subject to inspection.
Honduras - 1990. *Cichorium* spp. - entry permitted of leaves and stems subject to inspection.
Argentina - 1990. *Cichorium* spp. - leaves and stems permitted subject to inspection.
Peru - 1990. *Cichorium* spp. - leaves permitted entry subject to inspection.
Bolivia - 1991. *Cichorium intybus* - leaf buds permitted entry subject to inspection.

3b. Interceptions from FY 85-95

HOST	ORIGIN	PEST
CICHORIUM INTYBUS (LEAF)	Central America	SPODOPTERA SP.
CICHORIUM INTYBUS	Central America	APHIDIDAE, Species of
CICHORIUM SP. (LEAF)	Central America	AEOLUS SP. (Elateridae)
CICHORIUM SP. (LEAF)	Central America	HELIX ASPERSA
CICHORIUM SP.	Central America	AGROMYZIDAE, Species of
CICHORIUM SP.	South America	AGROMYZIDAE, Species of
CICHORIUM ENDIVIA (LEAF)	South America	APHIDIDAE, Species of
CICHORIUM ENDIVIA (LEAF)	South America	COPITARSIA, Species of
CICHORIUM ENDIVIA (LEAF)	South America	LIRIOMYZA SP.
CICHORIUM ENDIVIA (LEAF)	South America	NOCTUIDAE, Species of
CICHORIUM INTYBUS (LEAF)	South America	NOCTUIDAE, Species of
CICHORIUM INTYBUS (LEAF)	South America	NYSIUS SP.
CICHORIUM SP. (LEAF)	South America	AGROTIS SP.
CICHORIUM SP. (LEAF)	South America	ELATERIDAE, Species of
CICHORIUM SP. (LEAF)	South America	HELCOVERPA SP.
CICHORIUM SP. (LEAF)	South America	NOCTUIDAE, Species of
CICHORIUM SP. (LEAF)	South America	NYSIUS SP.
CICHORIUM INTYBUS	South America	LIRIOMYZA HUIDOBRENSIS
CICHORIUM SP.	South America	CONODERUS RUFANGULUS
CICHORIUM SP.	South America	BLAPSTINUS PUNCTULATUS

4. Pest List: Pests Associated with *Cichorium* spp. in Central and South America.

Table 2 shows the pest list for *Cichorium* generated after review of the information sources listed in USDA (1995). The pest list includes limited information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List - <i>Cichorium</i> spp. from Central and South America			
Scientific Name, Classification	Distribution ¹	Comments ²	References
Arthropods			
<i>Apogonalia grossa</i> Signoret (Homoptera: Cicadellidae)	BR	e	De Menezes, 1978
<i>Leptinotarsa decemlineata</i> (Say) (Coleoptera: Chrysomelidae)	GT,US	c	EPPO DATABASE
<i>Melanophus bivittatus</i> (Say) (Orthoptera: Acrididae)	US	c	Bailey & Mukerji, 1976
<i>Orthocephalus coriaceus</i> Fabricius (Hemiptera: Miridae)	US	c	Wheeler, 1985
<i>Pemphigus bursarius</i> (L.) (Homoptera: Aphididae)	CX,SX,US	c,z	Blackman & Eastop, 1994
<i>Spodoptera ornithogalli</i> (Gn.) (Lepidoptera: Noctuidae)	CX,SX,US	c,z	CIE, 1977
<i>Trichoplusia ni</i> (Hb.) (Lepidoptera: Noctuidae)	NI,SX,US	c,z	CIE, 1974; Ryder, 1979
Fungi			
<i>Alternaria cichorii</i> Nattrass (Deuteromycotina: Hyphomycetes)	AR,US(Florida)	c,f,z	David, 1995
<i>Botrytis cinerea</i> Pers.:Fr. (Deuteromycotina: Hyphomycetes)	Cosmopolitan	c,z	Ryder, 1979; Farr <i>et al.</i> , 1989
<i>Bremia lactucae</i> Regel (Oomycetes: Peronosporales)	CX,SX,US	c,z	CMI, 1969; Ryder, 1979; Morgan, 1981
<i>Cercospora cichorii</i> Davis (Deuteromycotina: Hyphomycetes)	AR,BR,US	c,z	Chupp, 1953; ARS Fungal Database
<i>Erysiphe cichoracearum</i> DC (Pyrenomycetes: Erysiphales)	Cosmopolitan	c,z	Ryder, 1979; Farr <i>et al.</i> , 1989
<i>Phoma exigua</i> Desmaz. (Deuteromycotina: Coelomycetes)	Cosmopolitan	c	Farr <i>et al.</i> , 1989
<i>Phymatotrichopsis omnivora</i> (Duggar) Hennebert (Deuteromycotina: Hyphomycetes)	US	c	Farr <i>et al.</i> , 1989
<i>Phytophthora cryptogea</i> Pethybr. & Lafferty (Oomycetes: Peronosporales)	AR,US	c	Stamps, 1978; CMI, 1985

<i>Puccinia hieracii</i> f. sp. <i>cichorii</i> (Belynek) Boerema & Verhoeven (Basidiomycetes: Agaricales)	CX,SX,US	c,z	Arthur, 1934; Boerema & Verhoeven, 1980
<i>Rhizoctonia solani</i> Kuhn (Deuteromycotina: Agonomycetes)	Cosmopolitan	c	Farr, 1989
<i>Sclerotinia minor</i> Jagger (Discomycetes: Helotiales)	Temperate including U.S.	c,z	Farr, 1989
<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary (Discomycetes: Helotiales)	Worldwide	c,z	Farr, 1989
<i>Thielaviopsis basicola</i> Berk. & Broome) Ferraris (Deuteromycotina: Hyphomycetes)	Cosmopolitan	c	Farr, 1989

Bacteria

<i>Agrobacterium tumefaciens</i> E. F. Smith & Towns.) Conn	CX,SX,US	c	CMI, 1980; Bradbury, 1986
<i>Erwinia carotovora</i> subsp. <i>carotovora</i> (Jones) Bergey	Worldwide	c,z	Bradbury, 1986
<i>Pseudomonas cichorii</i> (Swingle) Stapp	Widespread, US	c,z	Bradbury, 1986
<i>Pseudomonas marginalis</i> pv. <i>marginalis</i> (Brown) Stevens	SX,US	c,z	CMI, 1970; Bradbury, 1986; Moline & Lipton, 1987

Viruses

Cucumber mosaic virus	AR,BR,US	c,z	Francki <i>et al.</i> , 1979
Tobacco mosaic virus	AR,BR,PE,US	c,z	Zaitlin & Israel, 1975
Tomato spotted wilt virus	SX,US	c,z	Ie, 1970

Nematodes

<i>Ditylenchus dipsaci</i> (Kuhn) Filipjev	SX,US	c	Anon., 1984; Smith <i>et al.</i> , 1988
<i>Meloidogyne arenaria</i> (Neal) Chitwood	CX,SX,US	c	Taylor & Sasser, 1978; Anon., 1984
<i>Meloidogyne hapla</i> Chitwood	CX,SX,US	c	Taylor & Sasser, 1978; Anon., 1984
<i>Meloidogyne javanica</i> (Treub) Chitwood	CX,SX,US	c	Taylor & Sasser, 1978; Anon., 1984

1 Distribution legend: AR = Argentina; BR = Brazil; EC = Ecuador; GT = Guatemala; NI = Nicaragua; PE = Peru; CX = Central America; SX = South America; US = United States

² Comments: c = Organism does not meet the geographical and regulatory definition for a quarantine pests (NAPPO; FAO)
e = Although pest attacks commodity, it would not be expected to remain with the commodity during processing
f = Pest occurs in the U.S. and is not currently subject to official restrictions and regulations (*i.e.*, not listed as actionable, and no official control program)
z = Pest is known to attack or infest *Cichorium* and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

5. List of Quarantine Pests

Apogonalia grossa was the only pest that met the definition of a quarantine pest; however, this insect is not likely to remain with the product during handling and processing. Hence, the movement of *Cichorium* will not serve as a pathway. Because no quarantine pests were identified as following the pathway no further analysis is required. Consequently this PRA ends at this point with the following proviso: Should any pests intercepted on commercial (or any other) shipments of *Cichorium* be determined to be quarantine pests, action may be taken.

6. Conclusions:

These commodities are currently permitted entry subject to inspection from five Central American and four South American countries in addition to the countries comprising the West Indies. The scope of this assessment was the pests reported on *Cichorium* spp. in Central and South America. Therefore, this pest risk assessment will serve as documentation for any addition requests for *C. endivia* and *C. intybus* from countries within these areas.

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